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ON THE OSTEOLOGY AND SYSTEMATIC POSITION OF THE SCREAMERS (PALAMEDEA: CHAUNA).

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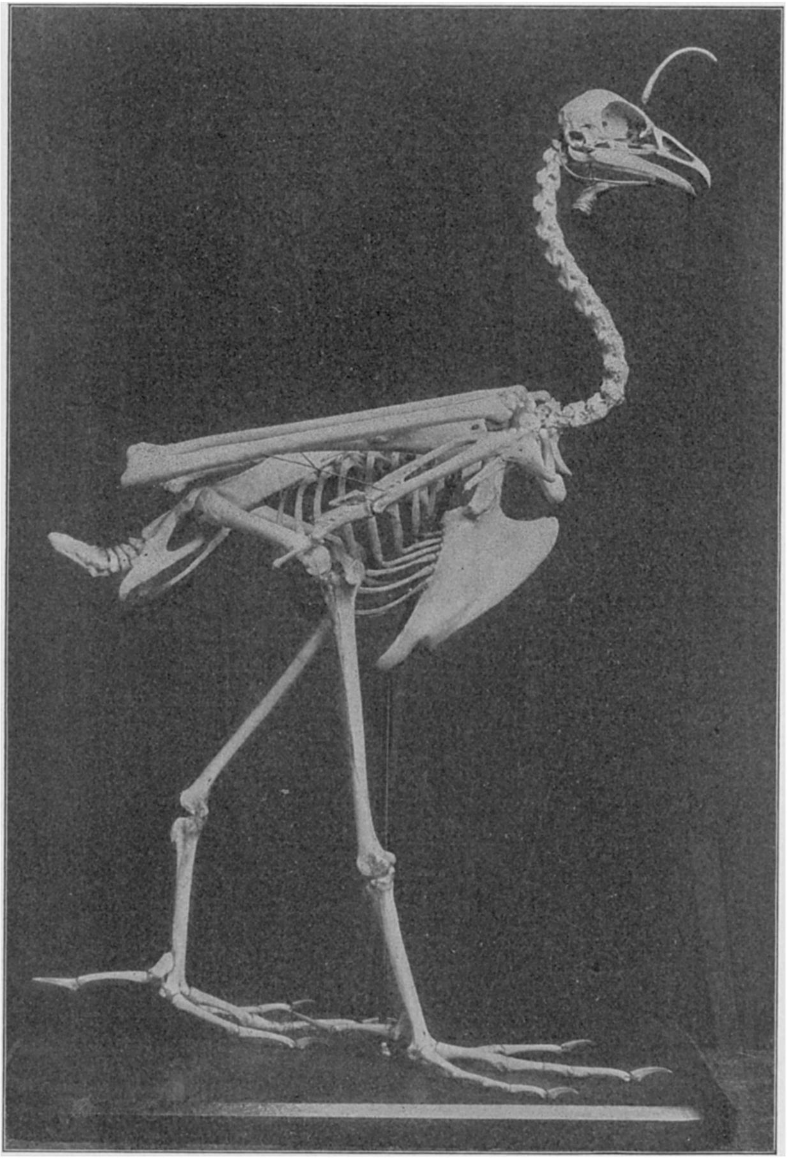
PROFESSOR William Kitchen Parker was the first to suspect that those remarkable birds known as the screamers might in some way be related to the Anseres, and as long ago as 1863 he undertook to point out in his excellent paper on the subject in the *Proceedings of the Zoölogical Society of London* (pp. 511–518) what the relationships between the two groups consisted in. A few years later, however, Huxley included them among his Chenomorphæ (*op. cit.*, 1867, pp. 436–460). Naturally such authorities carried great weight for some time, but when Garrod came to investigate the structure of *Chauna derbiana* he quickly arrived at the conclusion that the Palamedeidæ were surely no geese, whatever the affinity might be between the two groups (*P. Z. S.*, 1876, pp. 189–200). Dr. Sclater in 1880 created a distinct order for them (Palamedeæ), still keeping them, however, in the neighborhood of the Anseres. Dr. Stejneger includes them with the Chenomorphæ as a super-family (Anhimoideæ), as I have elsewhere pointed out, while Dr. Fürbringer makes an intermediate suborder for them standing between the anserine birds and the family Æpyornithidæ. Mr. Seebohm kept the flamingoes, Anseres, and the Palamedeæ as suborders in the order Lamellirostres; and Sharpe places only the Anseres and the screamers in an order Anseriformes. Professor Beddard (*P. Z. S.*, 1894) makes comparisons between Palamedea and Chauna, but expresses no decided opinion there as to the systematic position of the group.

Of all the accounts I have read of the osteology and taxonomy of the screamers, none come so near to what I consider to be the truth in the case as does the above-cited contribution



EXPLANATION OF PLATE.

Right lateral view of the skeleton of the horned screamer (*Palamedea cornuta*). Greatly reduced. Photograph of specimen No. 18,588 of the Osteological Collections of the U. S. National Museum. (Collected in Venezuela.)

of Garrod's in the *P. Z. S.* of 1876. His figures illustrating his remarks are extremely instructive, comparing as he does the occipital aspects of the skull of a Magellaine goose (*Chæphaga magellanica*), a Derbian screamer (*Chauna derbiana*), and a razor-billed curassow (*Mitua tuberosa*). He also gives the basal view of the skull of *Chauna derbiana*. Garrod draws some very careful comparisons among the several forms just named, and it is well worth the pains of the student of avian osteology and classification to read what he has to say, in the paper cited, in connection with the present contribution.

With the view of throwing additional light upon the affinities of the screamers, I have compared the skeleton of the horned screamer, *Palamedea cornuta* (see plate, opposite page), with that of the Coscoroba swan (*Coscoroba coscoroba*) and the common wild turkey (*Meleagris gallopavo*) and arranged the principal osteological characters characteristic of each form in the subjoined table in a comparative way, thus supplementing the results already achieved by Garrod and further emphasizing some of the opinions arrived at by him in regard to the systematic position of the screamers.

SKULL.	SCREAMER.	SWAN.	TURKEY.
General aspect.	Conspicuously galline.	Typically anserine.	Typically galline.
Superior mandible; vault of orbit and cranium; occipital area.	Characteristically galline.	As in other Anseres and quite different.	Agrees almost exactly with the screamer: galline.
Lacrymal bone.	Very small, but anserine.	Very large, with superior portion elongated.	As in the fowls generally, and very different.
Interorbital septum.	Entire.	Entire.	Perforated.
Quadrates.	Ansero-galline.	Anserine.	Galline.
Auricular opening.	Galline.	Anserine.	Galline.
Lateral processes of the cranium.	Anserine.	Anserine.	Fuse distally, and thus include a foramen.
Palate.	Desmognathous.	Desmognathous.	Schizognathous.

SKULL.	SCREAMER.	SWAN.	TURKEY.
Palatines and Vomer.	Galli-anserine, or with characters nearly equally divided.	Anserine.	Galline.
Facets of pterygoids.	Median, as in many pigeons.	Anterior.	Anterior.
Basi-temporal area.	Subtypically galline.	As in other swans and geese.	As in most true fowls.
Mandible.	Strongly galline, but with the angular processes approaching the Anseres in character.	As in other typical lamellirostral birds, and very different from Palamedea and the fowls.	Characteristically galline.
Hyoidean apparatus.	Galline.	As in the Anseres generally, and very different from Palamedea.	Galline.
VERTEBRAL COLUMN.			
Cervicals.	18. Pair of free ribs on last.	21. Two last bearing free ribs, with epipleural appendages on last pair.	16. As in the swan, but the last cervical *fused* with the first dorsal vertebra.
Ribs.	Six pairs vertebral ribs; *all without* epipleural appendages. Two pairs pelvic ribs; costal ribs of last pair do not reach the sternum.	Five pairs vertebral ribs; *all with* epipleural appendages. Three pairs pelvic ribs; costal ribs of last pair do not reach the sternum.	Four pairs vertebral ribs; *all with* epipleural appendages. One pair pelvic ribs; costal ribs of last pair do not reach the sternum.
[No epipleural	appendages on the	pelvic ribs in any	of these birds.]
Pelvis.	Narrow and longish, but on the whole with quite as many galline characters as anserine. Propubic processes absent. Distal ends of pubic elements *not* dilated.	Narrow and long. Propubic processes present. Distal ends of pubic elements greatly dilated.	Shorter, and broad in postacetabular region. Quite different from swan and screamer, but with propubic processes present, and distal ends of pubic elements *not* dilated.

VERTEBRAL COLUMN.	SCREAMER.	SWAN.	TURKEY.
Shoulder-girdle.	Anserine character decidedly prevailing. Os furculum U-shaped, with the arch very broad transversely and antero-posteriorly flattened; articulation with coracoids and scapulæ as in the geese. Coracoids more anserine than galline.	Os furculum U-shaped and typically anserine. As in the screamer, the coracoids do not come in contact when articulated *in situ*.	Os furculum V-shaped, and the elements of the shoulder-girdle all typically galline.
Sternum.	Anserine characters prevailing; but the posterior pair of notches shallower, and the lateral xiphoidal processes far broader.	Agrees with all the typical anserine fowls among the swans, geese, and some of the ducks.	Completely galline in character, and very different from the sternum of Palamedea.
Limbs.	*Highly* pneumatic.	Humerus only pneumatic (?)	Humerus pneumatic; femur partially so (?)
	Proportions and characters of pectoral limb, as compared with Meleagris, decidedly anserine. Large spurcores fused on carpometacarpus (upper one three times the size of distal one). Small ungual claws on pollex and index digits.	Bones of pectoral limb long and light, as in most large anserine birds.	Bones of pectoral limb are proportionately as well as actually considerably shorter and slightly stouter. Typically galline, with no special agreement with the corresponding ones in the wing of Palamedea.

VERTEBRAL COLUMN.	SCREAMER.	SWAN.	TURKEY.
Limbs.	Pelvic limb anserine, with long podal digits. Cnemial processes of tibiotarsus not as prominent as in the swans and fowls.	Hypotarsus of tarso-metatarsus somewhat like that of the screamer.	Hypotarsus very different from that process in Palamedea.

From an osteological point of view the screamers are extremely puzzling forms. Had we only the skull of *Palamedea cornuta* to judge from, there is no question but that avian taxonomers would have placed that species close to the gallinaceous group of birds, its desmognathous palate notwithstanding. We obtain but little light on the subject by the comparisons made of its vertebral column and pelvis, though in the latter we meet with some characters that seem to suggest an affinity with the storks.

Had we but its shoulder-girdle and sternum to judge from, it is quite questionable in my mind that from these bones alone its anserine affinities, or such as it may possess, would have been suspected, and it is only when the characters of these are taken in connection with others now known to us, that such a belief gains support. We should never suspect Palamedea of having any kinship with the Anseres were we to judge from the skeleton of its wing alone, though it is very likely that such a relation would have been suspected had we only the bones of the pelvic extremities to guide us.

Taken as a whole, the anserine characters of the skeleton of Palamedea, however, are more evident than those of any other group of the class, but these characters are neither typical nor are they strongly marked. Such galline characters as are exhibited in its skeleton are far more typical and most decidedly more evident. But neither its anserine nor its galline osteological characters are sufficiently pronounced to justify us in arranging the screamers either along with the Anseres or the gallinaceous fowls. Such other characters as it may have in its skeleton, derived from ancestral representatives of still other groups, are now too completely masked and too obscure for us to decipher, especially as all of the near relatives of these birds have long ago died out, leaving no existing forms to assist us in the matter. Palamedea, then, is doubtless the survivor of an extremely ancient stock of birds, and were it positively known that the gallinaceous types and the Anseres sprang from a common stock, and it is not at all impossible, such birds as the screamers may have easily appeared close down at the branching and then have ascended to the present time, showing but few structural changes in their organizations.

Palamedea is a strong, vigorous, and eminently combative type of fowl, and one not calculated, in time, to have been much modified by its surroundings, and so has preserved in its morphology the major share of its archaic structure.

I agree with Fürbringer that the screamers should be placed near the Anseres, but apart and in an independent group, standing between the latter and the ostrich types of birds.

The Palamedeæ, in fact, constitute a suborder of birds (although represented but by three existing species) coequal in the matter of distinctness with a number of others that have been created in the class Aves, and, as a group, even better defined and more distinct than not a few others. It is fortunate for us indeed that in their anatomical structure there is *so* much that enables us to recognize as clearly as we can the place occupied in the system and in the class by these birds and to predict with such certainty what their relationships are with the other main groups of avian forms.

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